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**REMARKS**

Claims 1-27 are pending in the case. Claims

**Claim Objections**

The Examiner objected to claims 1-27 due to the use of “determining” in claims 1, 11, 14, 22, and 26 because it is contended that the claimed controller (or other) unit that generates and transmits the retraining flit doesn’t determine the MTD because it is previously determined, i.e., at the design phase. While Applicants do not believe that such a narrow interpretation of “determining” is required, in order to expedite prosecution, the cited claims have been amended to replace “determine” or “determining” with –identify—or –identifying--. This should redress the Examiner’s concerns. For example, the controller “identifies” a minimum transition density, e.g., one that is pre-programmed into memory, and then generates retraining flits to satisfy the MTD. Accordingly, the objections should be withdrawn.

**Specification Objections**

The Examiner objected to the specification for the various following reasons, addressed in order as presented in the action.

The Examiner objects to the specification because he contends that “determining” is confusingly used synonymously with “maintaining”. Applicant disagrees with this contention. The term, as it is used in the specification, if anything, is being used synonymously with “identify”, “retrieve” or the like. It would be clear to anyone of ordinary skill what is meant by the link controller determining a MTD, in the context of the disclosure. The use of MTDs in communications is not new nor is it contended to be new. Similarly, controllers are not new, nor are Applicant’s contending that the invention is based on the use of a controller, how it

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determines MTD or the like. A skilled person would understand that there are numerous ways that a controller could determine an MTD. For example, as stated by the Examiner, it could be predefined during the design phase and then made available to the controller for operation, for example, it could be in firmware, programmed in a suitable memory structure available to the controller, or the like. On the other hand, it could be determined through a calculation performed by the controller based, e.g., on specific parameters for a given operating environment. As discussed, different actual MTDs may be desired, depending on the operating conditions, e.g., link distance, data transfer rate and data payload size. Persons of skill will understand how, as a matter of design choice, to decide on a suitable and/or desired MTD. Again, the use of minimum transition densities, as recognized by Applicant in the background section, are known to persons of skill. Persons of skill would understand the term as it is used, as well as how to practice the claimed invention in view of how it is used in the specification. Accordingly, the objection should be withdrawn.

Regarding CRC polynomial selection, Applicants traverse the objection. Persons of skill would understand how to use CRC with retraining flits as taught herein. CRC is commonly used to encode digital data streams. It is also known that more than one CRC polynomial can be used for a given sequence of data. The different CRC polynomials result in different CRC checksums, with some having more transitions than others. The disclosure (e.g., paragraph 0032) plainly teaches that when using CRC error encoding, one can calculate the different derived checksums from the different CRC polynomials available for a retraining flit and pick one resulting in a checksum, which will be part of the transmitted data, that satisfies or helps to satisfy the MTD. This would be understood by any person of ordinary skill.

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With regard to the Examiner's concerns of contradictions (e.g., in paragraphs 0023 and 0028), it is urged that there is no contradiction. To clarify for the Examiner's benefit, it is not required that multiple flits be generated for each period, i.e., one or more flits for every T seconds over an operating session of a link. Rather, one or more retraining flits are generated and transmitted when a critical period of time has occurred where an insufficient number of transitions have taken place. So, for example, for some even relatively large periods of time, retraining flits may not be transmitted if the communicated data, without any modulation coding or the like, has sufficient transitions on its own. On the other hand, if enough cycles have occurred without enough transitions, then one or more suitable retraining flits can be generated and transmitted to meet MTD. If no error detection is used, then the data in the data module will create payload data for a retraining flit with suitable transitions. Likewise, if error detection, such as CRC is used, then it will generate payload data, taking into account the error encoding with included checksum, etc., to have sufficient transitions. Accordingly, the objection should be withdrawn.

The Examiner contends that there is no description or drawing showing transmitted data or signal format other than the retraining flits. In response, Applicant urges that these things do not need to be spelled out for a skilled person to practice the invention. Please provide some indication, anything, that justifies the Examiner's concerns that more description for transmitting data including control and payload data for a clock derived link is needed. Communicating digital data in this way is well understood. Point-to-point links are not new, derived clocks are not new, and we are not contending as such. The objections should be withdrawn.

Regarding the Examiner's contention that, e.g., 2-5 transitions per 1024-4096 bits is unrealistic in that retraining could be done by unmodulated data without the need for special flits.

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Being able to avoid modulating the data, e.g., as is done with prior art techniques, is beneficial because it increases the practical bandwidth. On the other hand, even if the MTD is relatively small (e.g., 2-5 transitions per 4000 bits), one normally cannot simply count on enough natural transitions in the transmitted data. For example, it is possible that all '1s or '0s could be consecutively transmitted, depending on the application. so, the use of a retraining flit, as taught by Applicant, is not superfluous, trivial, or unrealistic. Rather, it is a useful technique that provides a unique solution to receiver/transmitter drift without having to use excessive overhead due to modulating all of the transmitted data. And yes, in some environments (e.g., close proximity, high data transfer rate, relatively small amounts of data as within many PCs), as small as 2-5 transitions per 1024-4096 bits of data may be sufficient for reliable communication.

Regarding, switching noise, how data is staggered is discussed and is shown, in contrast to the Examiner's contention. For example, the specification at paragraph 0027 states:

Thus, retraining flit 30' is twenty bits wide, with sixteen bits dedicated to the payload region 42' and four bits dedicated to the sideband region 43'. The retraining flit 30' is eighty bits long. In the illustrated case, the data module 32 (FIG. 1B) defines the payload data to have the maximum possible number of transitions per line. For example, the line assigned to bit position 0 of retraining flit 30' transitions from zero to one to zero back to one again (i.e., three transitions). The data module 32 (FIG. 1B) also staggers the payload data across the payload region 42' based on switching noise constraints. *In other words, all of the payload lines in a given transfer do not have the same value.* Such an approach reduces simultaneous switching noise. The control data can also be given the maximum possible number of transitions and a staggered distribution if necessary. (Emphasis added).

Also, for example, see Figure 3. there are 20 point-to-point lines and four shown transfers. For any given transfer, not all 20 lines have the same value. Thus, it plainly teaches that staggering may be employed, e.g., when creating a retraining flit such as when it is more than one cycle long, data may be shuffled so that every line of the parallel links are not

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transmitting the same value at the same time. Please expound further your precise confusion regarding this aspect of the disclosure if this remains unclear.

Regarding the Examiner's contention that it is ambiguous as to whether the retraining flits carry any useful data or are merely useful for retraining. In response, the disclosure is not so limited. It is not understood how this is the basis of an objection. If the Examiner questions the utility of the invention, then reject it under Section 101, but an objection is not warranted here, and it should be withdrawn.

#### **Drawing Objections**

The Examiner objected to the drawings for the same reasons as set forth above regarding some of the objections, i.e., as pertaining to staggering and CRC encoding. For the reasons set forth, it is urged that additional drawings are not required for an understanding of these concepts. CRC encoding is well known in the art and staggering is clearly described and even actually shown in Figure 3. Accordingly, these objections should be withdrawn.

#### **112(2) Claim Rejections**

Claims 1-27 are rejected under Section 112(2) as indefinite because it is contended that regarding the use of retraining flits, they do not sufficiently distinguish over an idle flit or modulated-encoded data. In doing so, the Examiner stated that there is no requirement that non-training data be placed between retraining flits. In response, it is pointed out that with the use of retraining flits, as taught herein, data does not need to be modulated, i.e., it has been discovered that the use of retraining flits, as taught herein, will suffice to maintain sufficient clock synchronization between a transmitter and receiver for clock derived links, without the need for modulation encoding. Normally transmitted data, depending on its natural number of transitions,

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may or may not “train” a receiver clock, but if it happens to not have enough transitions for a given period, then a retraining flit is inserted and sufficient synchronization is maintained.

Even though Applicants believe that the claims were sufficient and not indefinite, they have been amended to indicate that modulation-coding is not required to maintain sufficient synchronization in order to expedite prosecution. Accordingly, the rejections should be withdrawn.

**Section 102/103 Claim Rejections**

The Examiner sustained the rejections of the claims under Sections 102 and 103 based on Osborne and Burton. Applicants incorporate all previous arguments herein and assert for the reasons heretofore presented that the claims are patentable over these references. Moreover, now that they are amended to add that “wherein modulation-coding is not employed”, they are even more patentable over the references. Accordingly, it is requested that the rejections be withdrawn.

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**CONCLUSION**

Applicants assert that all claims are in condition for allowance. Applicants respectfully request the Examiner to pass this case to issue at the Examiner's earliest possible convenience.

If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at 512/238-7253.

Respectfully submitted,

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